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A CONTRIBUTION TO THE MAMMALOGY OF CENTRAL PENNSYLVANIA.

BY SAMUEL N. RHOADS.

In the following annotated list are presented the results of the author's study of the feral mammal fauna of central Pennsylvania during the past four years. The data here submitted is of three kinds: first, that recorded by the author, and based entirely on his own observations in the field; second, that obtained by employed assistants in the field, and verified by specimens and notes in the author's collection; third, notes obtained from other sources, the reliability of which the author has no reason to doubt. In all cases where the presence or distribution of any species rests on the third class of evidence the source of such evidence is stated.

The main sources of information are as follows, in order of sequence:

1. A collecting trip, by the author, to Pine Grove Furnace, Cumberland County, April 11 to 15, 1893. This included a visit to the limestone caves near Carlisle.

2. A collecting trip, by the author, to Round Island, Clinton County, May 25 to June 1, 1896; including a side trip taken to Emporium, Cameron County.

3. A collecting trip, by the author, to Eaglesmere, Sullivan County, August 20 to 28, 1896.

4. A collecting trip, by Mr. J. C. Ingersoll, September 24 to December 20, 1896; collecting being done at the following stations in order of sequence: a. Tuscarora, Juniata Co.; b. Mount Union, Huntingdon Co.; c. Tyrone, Blair Co.; d. Walsall and Kring's (near Johnstown), Cambria Co.; e. Summit Mills, Somerset Co.; f. Cook's Mills, Bedford Co.; g. Hopewell, Bedford Co.

Additional records and specimens have been obtained from Messrs. Seth Nelson, of Round Island, Clinton Co.; M. M. Larrabee, of Emporium, Cameron Co.; A. K. Pierce, of Renovo, Clinton Co.; R. W. Bennett, Eaglesmere, Sullivan Co.; and M. W. Streatly, of Chambersburg, Franklin Co. To all of these, especially Mr. Nelson, whose long and intimate acquaintance as hunter and trapper of the animals of Clinton, Centre, Clearfield, Cameron and Potter Counties is excelled by none, I gladly express my thanks for valuable aid.

The physical features of central Pennsylvania in all the localities

named above show but slight departure from the typical Alleghenian scenery with which the traveller from Harrisburg to Pittsburg becomes familiar in his westward route along the Juniata River. The whole country is more or less crowded with parallel ranges of mountains running northeast and southwest, much broken by coves and cross valleys whose numerous streams empty, with the exception of those of Cambria and Somerset Counties, into the Susquehanna.

The character of the Alleghenies over this wide area conforms closely to the continuous ridged type of parallel chains rising in long, flat-topped ranges, which rarely present a peak or dome to relieve their rounded, monotonous outlines. Their average height is about 1,200 feet, though an elevation of over 2,000 feet is reached in some localities. With the exception of Sullivan County, nearly the entire region treated in this paper is devoid of lakes, lying as it does almost wholly south of the southern border of the great terminal moraine.

Owing to deforesting and burning of the timber over the whole region, the character, not only of the existing flora, but in greater or less degree of the climate and fauna of the country, is more or less altered from the conditions of 100 years ago.

While this has resulted in the extinction of certain forms of reptiles, birds and mammals from their place in the fauna of Pennsylvania, it has not so affected the smaller mammalia, which continue to find in isolated places the necessary life environment.

Such places it has been the author's endeavor to search out and thoroughly explore, in order to supplement our historic knowledge of the larger exterminated species with reliable facts regarding those whose subterranean and retiring habits, or restricted range, have enabled them to escape the older methods of research.

Central Pennsylvania, with the exception of the lowlands of the Susquehanna below Sunbury and a large part of the Counties of Adams, York, Cumberland and Franklin in the south, is dominated principally by the semi-boreal climate, fauna and flora which Dr. Allen has fittingly named "Alleghenian," as contrasted with the colder "Canadian" of the north and the warmer Carolinian of the south. In the intermediate region between these last we find the most puzzling gradations of animal and plant forms. On the highest elevations, however, faunal distinctions are well marked and in strong contrast with those of the southern lowlands. The most boreal environment encountered in my investigations was at Eaglesmere, in Sullivan County, the only place in which the typical

form of *Peromyscus canadensis* has yet been secured. It is significant that here also is to be found one of the largest tracts of old-growth evergreen timber in the State. It is probable that systematic trapping in the tamarack swamps of the more northern Counties of Bedford and Susquehanna will show this and other "Canadian" species to be abundant. South of this, however, along the entire eastern extension of the Allegheny system east of the main ridge there seems to be an absence of this species, but in Cambria County and in Somerset County, near the Maryland line, there appears in the hemlock forests a form seeming to connect, in its diminished size and darker colors, the Canadian *Peromyscus* with a similar species discovered by the writer in the spruce forests which crown the lofty summit of Roan Mountain, N. Carolina. The Red-back Vole, *Evotomys*, also reappears in Somerset County, the most careful trapping in the intermediate region of Juniata and Huntingdon Counties failing to reveal it. From these facts it would seem that the southern extension of the typical Alleghenian mammals found in the northern counties of the State is confined to a narrow strip of the main western ridge through Clinton, Centre, Blair, Cambria and Somerset Counties into West Virginia. In the latter State, owing to the increasing elevation of the southern Alleghenies, these northern types of mammalian life are enabled to bridge the warm Carolinian zone as far south as northern Georgia, insensibly, but surely, appropriating those subtle modifications by which the climate of the southern mountains has transformed *Peromyscus canadensis* into *Peromyscus nubiterræ*, *Evotomys gapperi* into *Evotomys carolinensis*, and *Sciuropterus sabrinus* into *Sciuropterus silus*.

The author's collection of central Pennsylvania mammals, forming the basis of this paper, numbers about 600 specimens, the greater part of which are skins and skulls, with careful measurements and data taken in the field. Of these nearly 400 were taken by my assistant, Mr. J. C. Ingersoll, during the fall of 1896, as already outlined, and represent an amount of laborious mountaineering and conscientious care, which not only do him the greatest credit but form the only available means to a right understanding of the character and distribution of the smaller mammals of the south-central portion of the Commonwealth. The list enumerates 61 species and subspecies. Of these 10 are listed as subspecies, 3 are exotic species, 2 (Black Rat and Lynx) are probably exterminated, and 3 (Bison, Wapiti and Beaver) certainly exterminated.

1. *Didelphis marsupialis virginiana* (Kerr). Virginia Opossum.

Numerous in the southern valleys, rare on the higher mountains, and not found within the denser evergreen forests of the northern counties. As these are cut off the opossum extends its wanderings into the clearings of mountains where it had hitherto been a stranger. "In Clinton County very rare, one killed in 1895"—Nelson. "Rare, last winter two taken at Emporium"—Larrabee. "Coming in rarely around Eaglesmere in the last six years"—Bennett. "Well distributed throughout the southern Alleghenies"—Ingersoll.

2. *Bison bison* (L.). American Bison.

The former range of the bison eastward along the West-branch of the Susquehanna to the forks of the river below Lewisburg during the present century is conceded by Dr. J. A. Allen.¹ The last buffalo killed in central Pennsylvania was shot about the year 1800, by Col. John Kelly, in Kelly Township, Union Co., five miles from Lewisburg. The former presence of the bison in the western part of Bedford County is attested by the names given to Buffalo Mountain, Buffalo Creek and Buffalo Mills in that County. This forms a connecting link between the numerous herds of buffaloes formerly ranging over the Ohio River drainage in western Pennsylvania and the sparsely scattered bands which may have passed over the watershed into the Juniata valley at this point. The presence of sulphur springs in this vicinity with the associated open glade country is well known to be a favorite place of summer resort for this species, and it is significant that a tributary of the Juniata in Perry County is called Buffalo Creek. For further information regarding the eastward range of the buffalo in pre-Columbian times to the Delaware valley the reader should consult the author's paper in the *Proceedings* of the Academy of Natural Sciences of Philadelphia, 1895, pages 244 to 248.

3. *Cervus canadensis* (Erxl.). Wapiti, American "Elk."

The former range of this animal in Pennsylvania was closely co-extensive with that of the Bison, both species using the same trails, feeding grounds and licks among the western Alleghenies and passing thence eastward by the same routes to the Delaware valley. The elk was most numerous among the elevated mountain glades and eastern tributaries of the Allegheny and Monongahela Rivers. It was also fairly abundant in the early part of the century in Clinton,

¹ Monog. Amer. Bisons.—Mem. Mus. Comp. Zool., 1876.

Potter, Tioga and Lycoming Counties. The latter named regions formed the hunting grounds of my veteran friend, Seth I. Nelson, whose diary between 1831 and 1837 shows that he killed 22 elk during the period. Six of these were killed in 1833. The horns of one of these were so large that Mr. Nelson, who is about 5 ft. 2 in. high, told me he could stand erect beneath the skull when the head was inverted with the antler tips touching the floor. Mr. Nelson stated that one of the last elk known to have been killed in that region was secured on Bennett's Branch in Elk County by a party of Cornplanter Indians about 1865. A hunter named Wilson Morrison brought the carcass of an elk about that time to Lock Haven, claiming that he killed it. But it was afterward understood that he had paid \$25. for it to the Indians.²

The range of the elk and buffalo into the south central counties of Pennsylvania, east of Fulton County, is very improbable, if, indeed, they ever wandered that far. The main line of their eastern range on Mason and Dixon's line was probably along the valley of Castleman's River in Somerset County and the main ridge of the Allegheny mountain near that place, which formed a continuous trail of safety between their haunts in West Virginia and the Keystone State. North of this region their range probably spread northeastward as far south as the Juniata valley, but by far the largest number did not come south of the east and west branches of the Susquehanna. The presence of an Elk Mills and Elk Creek in Chester County, and of an Elkton in Cecil County, Maryland, would indicate their former presence in that vicinity, probably only as stragglers along the Susquehanna valley.

The only specimen of Pennsylvania elk known to me is an adult male in the Museum of the Academy of Natural Sciences of Philadelphia. It was shot by a white hunter in 1853, in McKean County, and was purchased for the Academy by a club of members.

4. *Dorcelaphus americanus* (Erxl.). Virginia Deer.

With the probable exception of York and Adams Counties, there is not a county in central Pennsylvania, between latitudes 79° 30'

²Since the above was in type Mr. Nelson sends me a clipping from the *Utica Saturday Globe* giving a detailed account of the discovery of a bull elk by himself and Ira Parmenter on the headwaters of Bennett's Branch in 1867. A veteran Indian hunter of the Cattaraugus Reservation, named Jim Jacobs, trailed this elk simultaneously with Wilson and Parmenter into the headwaters of Clarion river, where the Indian, by superior cunning, made a circuit and killed the game in a laurel thicket before the white hunters arrived. Mr. Nelson writes me that this account is correct.

and 76° 30', where the Virginia Deer does not now exist in a wild state. In some of these it is practically exterminated, occurring in its former haunts only as a straggler. In none of these is it common, even in the most protected wilds.

Of the localities known to the writer, those most frequented by deer are the headquarters of Loyalsock Creek, Sullivan Co., the northern part of Clinton County, and Licking Creek in the northern part of Fulton County.

Seth Nelson (Jr.) killed 23 deer in the fall season of 1873, chiefly in Clinton County. In the period between 1861 and 1865 the deer became so numerous in that county that they greatly damaged the crops, and snaring was employed to diminish their numbers. In contrast with this there were killed in 1895, in his vicinity, all told, only ten deer, and most of these out of season, by wild hounds or pot hunters. The chief agencies in the extermination of deer are forest fires and wandering dogs, both of which pursue their relentless course during the entire year, the latter being ten times as destructive as the gray wolf ever was.

5. *Lepus sylvaticus* Bachm. Carolinian Wood Hare.

With the exception of the deepest evergreen forest areas on the higher mountains, no locality in Pennsylvania is a stranger to this abundant species. In the northern counties, at higher altitudes, it is represented by the following race.

6. *Lepus sylvaticus transitionalis* Bangs. Alleghenian Wood Hare.

Two specimens, almost typical of this subspecies, as described by Mr. Bangs, were recently received from Mr. Nelson, who took them near his home in Clinton County. A specimen from Summit Mills, Somerset Co., taken by Mr. Ingersoll, shows a near approach to the Clinton County specimens; but four others, from the same locality, are nearer *sylvaticus*. As the higher forested mountains are cleared, this is the form of "Cottontail Rabbit" which replaces the now nearly exterminated "Snowshoe Rabbit" or Varying Hare.

7. *Lepus americanus virginianus* (Harl.). Alleghenian Varying Hare.

This southern race of the Northern or Varying Hare is rapidly approaching extinction in the greater part of the Pennsylvania Alleghenies once inhabited by it. In the more retired tamarack and hemlock swamps of the northern counties this hare is fairly numerous, but they remain only in isolated places on the main ridge of the western mountains, southward. In the region traversed by Mr.

Ingersoll they were not known at Tuscarora, Juniata Co. They were reported as yet occurring in the western part of Huntingdon Co., and in Blair Co., 7 or 8 miles west of Tyrone. The old hunters of southern Cambria County formerly knew of them, but they had been killed off several years ago. The same report applies to Somerset Co., except that some were thought likely to remain on Laurel Ridge in the northwestern corner of the county.

"Becoming rare and local in Clinton Co."—Nelson. "Numerous in Cameron County, but decreasing as the woods are cut off"—Larabee. "Abundant about Eaglesmere"—Bennett.

8. *Erethizon dorsatus* (L.). Eastern Porcupine.

In the mountains of the northern counties as far south as the West Branch of the Susquehanna the porcupine is frequently met with, and in some localities is quite abundant, as in Clinton and Sullivan Counties. At the present day, so far as records are obtainable, this animal does not occur in southern Pennsylvania, though Mr. Ingersoll was told by a farmer, Abraham Hay, of Summit Mills, that he saw one that was killed near Bakersville, Somerset County, 15 years ago. A mountaineer named Wildmann told Mr. Ingersoll that he had heard of one being killed in northern Juniata County on the Black Log Mountain. East and south of a line connecting the last two places the range of the porcupine probably rarely extended. Statements from hunters in Franklin and Cumberland Counties lead me to believe that the porcupine never lived in their limits.

9. *Castor canadensis* Kuhl. American Beaver.

There is little doubt that this animal is wholly exterminated over the entire Commonwealth. So long ago was this effected that no person with whom I have communicated has met with them. Mr. Seth I. Nelson, who hunted in the thirties in Potter County, when that county was largely covered with virgin forest, and the elk, wolf and pekan were still numerous, never met with the beaver. In contrast with this we have the following statements from his son, Seth Nelson (Jr.): "The last [beaver taken in this state] was killed on Pine Creek nine years ago [1884]. A part of Pine Creek is in Clinton County, part in Potter County, and part in Tioga County, but the beaver was started in Potter County and followed down through Tioga County, and killed in Clinton County."

10. *Zapus hudsonius* (Zimm.). Meadow Jumping Mouse.

While reported as a well-known species in all localities, I failed to get any specimens. Mr. Ingersoll secured none during his expedition, perhaps on account of the mice having gone into winter quarters. He heard of them at Tuscarora and at Hopewell, in both cases the meadow species being designated.

11. *Zapus insignis* Miller. Woodland Jumping Mouse.

The first Pennsylvania specimen of this species was taken by my friend, Wm. A. Shryock, near Pocono, Monroe County, and recorded in the *American Naturalist* in 1894. In the summer of 1896 I examined a mounted specimen in the collection of Mr. A. K. Pierce, of Renovo, who stated it was taken in a hemlock ravine near Howard Station, Elk County, a few years previously. Two specimens were taken near Eaglesmere by me in August, 1896.

This species may perhaps be found as far south as Somerset County, along the culminating ridge of Allegheny Mountain, but its predilection for to the northern Alleghenian region seems pretty well proved.

12. *Synaptomys cooperi* Baird. Cooper's Lemming Vole.

The first Pennsylvania record for this mouse was given in my paper on the mammals of Monroe and Pike Counties.³ Mr. Ingersoll captured five in a springy meadow at the foot of the low mountain near Kring's Station, Cambria County, close to the Somerset County line. They were all taken within a space of 50 acres, in runways among high grass and matted herbage near an old clearing. During the time covered in trapping them about six times as many meadow voles were taken in the same spot. No other specimens have been met with in central Pennsylvania,⁴ though the species undoubtedly occurs in isolated places throughout the northern and western parts of the region. The Kring's series agree perfectly with specimens from northern New Jersey and Roan Mountain, North Carolina.

13. *Evotomys gapperi* (Vig.). Gapper's Wood Vole.

Wherever the coniferous woodland remains undisturbed in the Allegheny region this species abounds in moist ravines and swamps. Beyond these situations it rarely wanders, although two specimens were taken on the dry, rocky summit of Negro Mountain, Somerset County, along the wooded cliffs inhabited by *Neotoma magister*.

³ Proc. Acad. N. Sci., Phila., 1894, p. 391.

⁴ A young male specimen just received, was taken in Clinton County, April, 1897, by Mr. Nelson.

Specimens in the author's collection were taken at the following localities: Eaglesmere, Sullivan Co., 4; Round Island, Clinton Co., 3; Summit Mills, Somerset Co., 22. Mr. Ingersoll did not find any in the Alleghenies except at Summit Mills, probably more on account of the lack of suitable environment for them in places visited than because this species is not found in the isolated hemlock swamps which yet exist in Juniata, Mifflin and Huntingdon Counties.

Comparison of a large series of Pennsylvania and northern New Jersey *Evotomys* with series from Quebec shows remarkable external similarity, there appearing no tendency to variation which can be said to be constant.

14. *Microtus pennsylvanicus* (Ord). Wilson's Meadow Vole.

Abounding in open situations throughout the district up to highest elevations where food supply abounds.

A somewhat remarkable color variation in this unusually constant species is found among the fine series taken in Juniata, Huntingdon, Blair and Somerset Counties by Mr. Ingersoll. Nearly all the specimens, compared with examples from the New England, New Jersey and eastern Pennsylvania, are noticeably browner, even in the half-grown young. About a dozen of the adults are of two shades of umber-brown over the whole upper parts, two from Tuscarora being almost a deep blackish chestnut. It is somewhat remarkable that all these umber specimens, except one from Bedford County, are females. Other specimens of both sexes taken in the same localities with these do not differ markedly from typical *pennsylvanicus*. The cranial characters of the brown specimens seem to be like those from Philadelphia County.

15. *Microtus pinetorum* (LeC.). Pine-woods Vole.

Occurring in south-central Pennsylvania; but no specimens have yet come to my notice other than those recorded from Carlisle by Prof. Baird. It has not been found in the higher mountains, nor in the northern counties.

16. *Fiber zibethicus* (L.). Muskrat.

This abundant, and in many cases most destructive of the Rodentia, holds its own in all parts of its extensive habitat. It seems neither to increase nor diminish in numbers, whatever may be the agencies exerted for or against it.

17. *Peromyscus leucopus* (Raf.). Carolinian Deer Mouse.

This very common mouse shows but slight variation from the typical form of the Ohio valley, throughout central Pennsylvania.

It is found in all wooded parts of the State, at all altitudes ; its range somewhat overlapping that of *P. canadensis* in the borders of the denser evergreen forests of the northern counties. As in the cases already cited under *Microtus pennsylvanicus* there is a strong tendency in the Deer Mice of the Juniata river watershed to assume a darker, deeper shade of brown than the normal colors seen in eastern specimens.

18. *Peromyscus canadensis* (Miller). Canadian Deer Mouse.

Four typical specimens of this distinct species were taken in the primeval forest about two miles from Eaglesmere. They were not found in a similar forest in Clinton County, *leucopus* only being taken there. It is likely that typical *canadensis* is not found in Pennsylvania except along its northern border, in the most boreal environments of the mountain tops in isolated localities. Along the culminating ridge, southward, it intergrades into the following subspecies, inhabiting the loftier summits of the southern Alleghenies.

19. *Peromyscus canadensis nubiterræ* (Rhoads).⁵ Cloudland Deer Mouse.

Of great interest, as showing the true relationships of the long-tailed, dusky deer mouse of the balsam forests of Tennessee and North Carolina, is a series of 29 *Peromyscus* taken in Cambria and Somerset Counties, Pennsylvania, by Mr. Ingersoll. Nine of these were trapped at Kring's Station, the remainder at Summit Mills. In size and proportions these are conclusively connectant between the large form found in Canada and New England and the diminutive cloud-dweller of the Great Smoky Mountains. In color the Pennsylvania series shows a marked tendency to assume the dark brown shades of the upper parts, which distinguish *nubiterræ* from the ochraceous gray of *canadensis*. The wide, dark dorsal area characteristic of Roan Mountain specimens is also apparent in those from Somerset County, but the pencil of white hairs at the anterior base of ear in *canadensis*, absent in *nubiterræ*, is retained by all in the series taken by Mr. Ingersoll.

An average of four of the larger adults of *canadensis* from Peterboro, New York, recorded by Mr. Miller, gives the following measurements in millimeters: total length, 190; tail vertebrae, 99; hind foot, 21.5. Similar measurements of four specimens from Somerset County are: total length, 180; tail vertebrae, 91; hind foot, 22; while those of *nubiterræ* respectively are 167, 86 and 21.5. The

⁵*P. leucopus nubiterræ* Rhoads; Proc. Acad. N. Sci., Phila., 1896, p. 187.

skulls of the three series show a parallel gradation in size southward from *canadensis* to *nubiterræ*, but no diagnostic features of a higher grade to distinguish the two extremes. It is of interest to note that the decrease in size of body as the species nears the Carolinas is not correlated by a shortening of the tail and hind feet, but that these members are relatively longest in *nubiterræ*.

Mr. Ingersoll makes the following notes on this subspecies:

"*Peromyscus canadensis* I took only at Krings in Cambria Co. and at Summit Mills in Somerset Co.

"At Kring's they seemed to prefer the most retired and secluded places, especially the narrow and deep wooded valleys with little streams flowing through. The first I caught were in such a place, the timber being mostly oak and beech and maple, with here and there a hemlock. Many old and decaying logs and stumps offered them pleasant homes, and nowhere else in that locality did I find them so abundant, and never did I find any at any great distance from the water, nor more than half way up the low mountain. *Peromyscus leucopus* and *Blarina brevicauda* were also taken in the same places.

"At Summit Mills, a region altogether higher, *canadensis* seemed to have replaced *leucopus* entirely, and there I took them everywhere, in stone walls along the edges of fields grown up to briars and bushes, in oak woods and in hemlock woods, and one in a trap set among the rocks on the top of a mountain for Rock Rats [*N. magister*]. I caught a rat in the same place. Traps set for *Evotomys* in low, damp ground also often caught *P. canadensis*."

20. *Neotoma magister* Baird. Allegheny Cave Rat.

So far as I have been able to discover, this rat has been taken in the following localities in middle Pennsylvania:

Clinton County:—"Plentiful in our rocky mountains"—Nelson.
"In mountains near Renovo"—Pierce.

Cambria, Somerset and Bedford Counties:—"Found locally in the tops of the mountains"—Ingersoll.

Adams and Franklin Counties:—"In rocky gorges in South Mountain, near Graffensburg"—M. W. Streatly.

Cumberland County:—"Living among Lewis's Rocks (type locality of *N. pennsylvanica* Stone)—J. G. Dillin, S. N. Rhoads. Limestone caves near Carlisle and opposite Harrisburg (type locality of fossil *N. magister* Baird)—S. F. Baird.

Specimens (both recent and fossil) in the collections of the Academy of Natural Sciences of Philadelphia and of the writer, rep-

resent all of the above named localities except Graffensburg. Specimens from the latter place were examined by the author.

The hunters in Sullivan and adjoining counties deny the existence of this rat in that region. I could find no signs of them around Eaglesmere. There are undoubtedly connecting colonies of this species along the Blue Mountains from Harrisburg to Massachusetts. Links in this chain have been found at Greenwood Lake, New Jersey, and on the Hudson Highlands, New York. It remains for future investigators to trace their range over the intermediate region and demonstrate the distribution of this large mammal throughout the oldest and most populous mining region of North America, whose very existence as a living species was unknown to naturalists as late as the year 1893!

21. *Mus musculus* L. House Mouse.

The common name given this little pest is by no means specific of its habitat. Mr. Ingersoll secured a series of 42 in Juniata, Huntingdon and Blair Counties, nearly all of which were taken in fields distant from houses or outbuildings. They were especially numerous in upland meadows, in the runways of *Microtus* and *Blarina*. This experience is, however, exceptional, for in other parts of the State I have only occasionally been troubled by them in such places.

22. *Mus decumanus* Pallas. Norway Rat.

This species is quite as much at home in the coal and iron mines of the mountains as in the farmer's barns or the crowded wharves of our great cities. It is sometimes found in the same caves with *Neotoma magister*. Which of the two is master I have had no means of determining, but it seems probable that the native animal is able to resist any encroachments on his vested rights. Otherwise it would have long since disappeared from localities it yet inhabits.

23. *Mus rattus* L. Black Rat.

I was unable to secure any recent records of this once common introduced species.

24. *Arctomys monax* (L.). Eastern Marmot.

Abundant in all situations. Specimens from the mountains of the northern counties are intermediates, approaching the Hudson Bay form, *Arctomys monax melanopus* (Kuhl.).

25. *Tamias striatus* (L.). Carolinian Chipmunk.

26. *Tamias striatus lysteri* (Rich.). Canadian Chipmunk.

Chipmunks from Sullivan and Clinton Counties are intermediate between the southern animal and the Canadian form, *lysteri*. Those

from the southern half of the State are typical *striatus*. The series from Somerset and Blair Counties have darker rusty crowns and rumps than those from Eaglesmere and Round Island.

27. *Sciurus ludovicianus vicinus* Bangs. Eastern Fox Squirrel.

I have been unable to lay hands on any Pennsylvania specimens of this squirrel except those of the light gray phase presented many years ago to the Academy of Natural Sciences by Drs. Heerman and Woodhouse. The exact locality of their capture is not given.

Mr. Bangs, in his review of the eastern Squirrel,⁶ quotes Dr. B. H. Warren in stating that this species "is practically extinct in Pennsylvania, except in the counties of Dauphin and Cumberland." The following notes will be of some value in estimating the status of this animal in the Commonwealth.

Clinton County :—"Not plenty. I killed 3 last fall [1894]"—Nelson.

Cameron County :—"Very rare; have not seen any for years"—Larrabee.

Sullivan County :—"Rare; never seen on tops of the mountains"—Bennett.

Cumberland County :—"One reported seen near Pine Grove Furnace in 1892. Nearly exterminated"—Rhoads.

Mr. Ingersoll was unable to get any reliable notes of this species in his journey through the central Alleghenies. They are practically extinct in that region.

28. *Sciurus carolinensis leucotis* (Gapp.). Northern Gray Squirrel.

This animal continues to abound wherever enough timber remains to supply food and shelter, even in the more densely populated localities. In the northern parts of the State, especially the north-western counties, the proportion of black or melanistic individuals of this species sometimes equals and often exceeds the normal gray form. This is reported to be the case in Clinton County by Mr. Nelson, where the "blacks" sometimes outnumber the "grays" two or three to one. In Sullivan County Mr. Bennett finds the "blacks" numerous, but the "grays" predominate. I have never seen nor heard of a black squirrel in southeastern Pennsylvania.

29. *Sciurus hudsonicus* (Erxl.). Canadian Red Squirrel.

30. *Sciurus hudsonicus loquax* Bangs. Carolinian Red Squirrel.

After consulting a series of nearly 60 Chickarees from Maine, Ontario, Pennsylvania and New Jersey, I am somewhat puzzled to

⁶ Proc. Biol. Soc., Washn., 1896, p. 150.

formulate any rule by which typical *hudsonicus* and its subspecies *loquax* may be distinguished. Strictly comparable specimens taken at the same season in Maine and southern New Jersey are in some cases very similar. The greater relative length of tail and hind foot, however, in the southern animal is fairly diagnostic. The large series taken by Mr. Ingersoll on the mountains of Somerset County are but slightly different from Delaware and Chester County specimens, not sufficiently so to warrant their subspecific separation as expressed by the habitat assigned to each by Mr. Bangs.⁷

It is more reasonable to restrict the habitat of typical *hudsonicus*, as in the case of some other Canadian species ranging into the southern Alleghenies, to the northern parts of Pennsylvania. In this case the *loquax* intermediates of the southern Alleghenies give place on the balsam belts of the Great Smoky Mountains to a dusky, imperfectly differentiated form which differs almost as much from *hudsonicus* as does *loquax*. Some winter skins from Clinton County differ sufficiently in measurements and the character and color of pelage to be classed more properly with *hudsonicus*.

31. *Sciuropterus volans* (L.). Carolinian Flying Squirrel.

The smaller flying squirrel abounds in the entire region included in this paper. No specimens have been received from the northern counties. A specimen taken near Renovo, Clinton County, in the collection of Mr. Pierce, is *volans*. The result of Mr. Bang's inquiries into the distribution of this animal indicates that the large species, *sabrinus*, will not be found in the State.

32. *Putorius vison* Schreb. Canadian Mink.

33. *Putorius vison lutrecephalus* (Harlan). Carolinian Mink.

From the statements of hunters, added to personal experience, the mink may be said to be numerous and evenly distributed over the entire upland and lowland regions of Pennsylvania. Taken as a whole the Pennsylvania minks are more typical of the southern race, but in the northern mountain streams are very near the Canadian type.

34. *Putorius noveboracensis* Emmons. Carolinian Weasel.

Though rarely seen, this animal is a stranger to no part of the State. In the south its change to the white winter dress seems quite as irregular as the relative severity of the season and amount of snowfall. The winter skins of this animal are often sent to the fur-

⁷ Proc. Biol. Soc., Washn., 1896, pp. 159, 161.

riers by Pennsylvania trappers, and in but few instances have I noted any in white pelage.

It is not improbable that *Putorius cicognani*, the small northern species, may be found in boreal Pennsylvania; so far, however, I have been unable to get any record of it.

35. *Lutra hudsonica* Lacép. North American Otter.

Recent records of this wary animal in many of the streams and lakes of the region are so numerous that it is not necessary to enumerate them here. The otter has by no means been exterminated in any county in central Pennsylvania, though it may rightly be said to be now a rare species, wherever once abundant.

36. *Mustela americana* Kerr. Canadian Marten.

The following records show that this valuable fur bearing animal has not been wholly exterminated in the Allegheny Mountains.

1. Columbia County:—"Mountains north of Benton"—H. Coward. Skin in collection of the Academy of Natural Sciences, No. 1,563, ♀, captured, as above, in the fall of 1892.

2. Sullivan County:—"One was trapped last winter (1895-'96) near Eaglesmere"—Bennett.

3. Clinton County:—"Once abundant in the beechwoods of this and adjoining counties, now very rare; saw tracks of two in Clinton County, winter, 1895"—Nelson.

4. Cameron County:—"Found in hard wood timber. Received several light colored pelts from Shippen Township in 1894. Got 3 from same township in winter of 1895"—Larrabee.

5. Potter County:—"I received 22 pelts from a hunter who trapped them on the east fork of the Sinnemahoning during the winter of 1894-'95"—Larrabee.

I had the privilege of examining several of the furs of Marten above recorded by Mr. Larrabee. Mr. M. W. Strealy, of Chambersburg, took considerable pains to inquire of old hunters of the South Mountain region concerning the presence of this animal. Among these was an old furrier whose father had all his life been in the same trade in that section. Another informant was a mountaineer 98 years' old. Mr. Strealy states that neither of these men had ever heard of the marten or sable being taken in the South Mountain, or the counties of that region.

37. *Mustela pennanti* Erxl. Pekan or Fisher.

The Fisher or Black Cat has for many years been practically extinct in Pennsylvania. Such, at least, is the verdict of nearly

every hunter with whom I have communicated; and many men of middle age, who have had twenty years' experience in mountaineering, never saw the track of one where they were formerly numerous, while many other trappers had not even heard of such an animal.

The elder Seth Nelson caught many of them in the beech woods of Potter and Tioga Counties, between the years 1827 and 1845.

Mr. Larrabee, of Emporium, Cameron County, declares there are yet a few in Shippen Township. The tracks of one were seen, and traps set to catch it, during the winter of 1895-'96.

A mounted specimen, taken in Pennsylvania, is in the Academy of Natural Sciences. It has no more definite data, and was evidently taken many years ago.

On March 11, 1896, a fine male Pekan was shot by Christ. S. Nunnemacher on the borders of a wood on Mill Creek, 2 miles north of Bird-in-Hand, and about three miles east of Lancaster, Lancaster County. Mill Creek rises in the Welsh Mountains. This animal had been making depredations on the farmer's poultry in that vicinity for some months, and was finally discovered by some dogs in company with Nunnemacher. The animal was taken to Dr. M. W. Raub, of Lancaster, to be mounted, and the stuffed specimen is now in his possession. In a letter from Dr. Raub I have received full confirmation of the above facts, and unmistakable evidence that the animal was *not* a "Marten," as reported in the Lancaster newspapers of that date.

38. *Mephitis mephitica* (Shaw). Canadian Skunk.

39. *Mephitis mephitica elongata* Bangs. Carolinian Skunk.

Central Pennsylvania presents us with two forms of skunks, neither of which are typical of the above species and subspecies as defined by Mr. Bangs.⁸

In Clinton County Mr. Nelson states that only about 1 in 20 are black with a small white head spot. These are of double value as fur.

This animal is equally abundant at all elevations, in deciduous forest growths.

40. *Procyon lotor* (L.). Raccoon.

Though not often seen, the Raccoon continues to exist in thickly populated districts where forests continue to afford some shelter. Although much sought after by trappers and hunters it holds its own in all sparsely settled districts, both mountain and lowland.

⁸ Proc. Bost. Soc. Nat. Hist., 1895, pp. 1-7.

41. *Ursus americanus* Pallas. American Black Bear.

Several bears are trapped every year in central Pennsylvania, and some of these generally reach the Philadelphia market during the winter. It is a good rule that where one finds the Virginia Deer there are pretty sure to be some bears, and where the former are exterminated the bears are very scarce or never seen.

There is probably not a county coming within the scope of this paper, in which the black bear has been completely exterminated. They are, perhaps, more numerous in the counties surrounding Clinton County than elsewhere. Seth I. Nelson and his son concur in the belief that bears have been more numerous in the past 15 years than before that time, the clearing of the evergreen timber and increase of brush land and deciduous forests being to their advantage. About the year 1883 the junior Nelson killed 7 bears in East Keating Township, Clinton County, alone. In 1893 he killed 4. I examined the pelts of several recently taken by Mr. R. W. Bennett, near Eaglesmere, where they also seem to be numerous.

42. *Urocyon cinereoargenteus* (Müll.). Northern Gray Fox.

Though very rare in the mountains of the northern tier of counties, this species may be said to visit every township in the state. It is probable that this statement could not have been made 20 years ago, but the destruction of the forests in this, as in other cases, has made possible such an extension of the range of the gray fox into the once undisputed habitat of the red fox.

Regarding the dexterity of this species in climbing trees the junior Nelson told me he had seen one ascend after a squirrel to the height of 60 feet on an erect dead pine stripped of its bark. It did this voluntarily, literally "shinning" 25 feet up the branchless trunk and backing down again, as a boy would do it. He has known his dogs to run them up an erect tree 18 inches in diameter, the first limb of which was 20 feet from the ground.

43. *Vulpes pennsylvanicus* (Bodd.). Red Fox.

More abundant in the mountains, but found more or less numerously in all localities beyond the limits of towns and cities.

44. *Canis nubilus* Say. Northern American Wolf.

The following notes seem to indicate that the wolf has never been wholly exterminated in Pennsylvania, but that there yet exist some of these wary rovers of the wilderness, to attest the theory that no country where the Virginia deer remain is free from their incursions.

It is well known that the wolf is frequently noted in the Allegheny Mountains of West Virginia, and the nature of the country lying between these and the wilds of western Pennsylvania so favors communication between the two that it requires no stretch of fancy to understand how these crafty wanderers yet defy extermination.

Cameron and Potter Counties :—"Practically exterminated. One hunter saw wolf tracks a year ago [1895]"—Larrabee. "One seen in Potter County recently"—Nelson. This was previous to 1893. "I was told by 3 men that they saw 2 wolves catch and kill a deer in Wyckof Run [Gibson Township, Cameron Co.] alongside of the lumber railroad"—Nelson. No date of this occurrence was given, but it was furnished among some notes of recent records. "I heard a man on Kettle Creek killed a wolf this fall [1896] in Potter County, but I can't find out his name"—Nelson.

Clearfield County :—"The last wolf was killed in Clearfield County with a club by a man on horseback the winter of 1891-'92. It was killed by William Bonsall of the same county"—Nelson.

Clinton County :—"I have been told by 2 hunters that they saw 2 wolves this winter [1893-'94] about 6 miles from my place [Round Island], but I have been all through that woods, and see no signs of anything but lynx, wild cats and foxes. I think it was lynx they saw instead of wolves"—Nelson.

Elk County :—"A wolf was killed in Elk County about 9 years ago [1887?] by a deer hunter"—R. B. Simpson.

Sullivan county :—"Long since exterminated"—Bennett.

It may be stated in this connection that a wolf was killed at Prompton, in Wayne County, in the winter of 1897 by Daniel Routan. "It was run in from York state by a hound"—G. D. Stevens. Mr. Nelson also informs me that he has heard of wolves being seen recently in Erie County.

45. *Lynx ruffus* (Guelde.). Eastern Bay Lynx.

The wild cat is quite abundant in the denser forests of the State, and often lingers close to long established centres of population in the mountain country.

46. *Lynx canadensis* Kerr. Canada Lynx.

Although the majority of reports concerning the existence of this animal in Pennsylvania relate to the bay lynx or wild cat there is no doubt that the Canada lynx formerly visited the more boreal portions of the north country.

Mr. Larrabee, who recognized the specific distinction between the two, told me that he knew certainly of the capture of one in Cameron or Potter County within 16 years.

I have received no information of authentic records of the recent capture of this species in the State.

47. *Felis concolor* L. Puma, Panther.

Once found in all portions of the Commonwealth, the Panther now is restricted to the most inaccessible mountain districts. The numerous wild cat and "catamount" stories which find their way into the newspapers, describing the capture of so-called Panthers in the Allegheny Mountains, have justly made the more conservative class skeptical of their existence in the State. Careful inquiry, however, shows that not only are there well authenticated instances of their capture within the last ten years, but that a few may remain in the wilderness of Clearfield and its surrounding counties, as well as in the northeastern section of the State.

Sullivan County:—"My father killed the last one in this region certainly known to me, between the years 1855 and 1860"—Bennett.

Clinton and Clearfield Counties:—"There may be one or two yet in Clearfield County; but the Askey boys and I killed 2, two years ago [1891]"—Nelson. In a later letter Mr. Nelson writes: "Those panthers skins, with two others, went to Germany with a lot of other furs, by Schrader & Co. I did not kill the panther, it got in my bear-trap, and was dead when I came to the trap." Not being able to hear more particularly from Mr. Nelson at this writing, I interpret him to mean that the "Askey boys" killed their panther in Clearfield County on a hunting trip with Nelson. This is in line with a statement he made to me in conversation one year ago. The panther caught in bear-trap by Nelson was probably caught on his regular trapping grounds in Clinton County.⁹

Potter and Cameron Counties:—"None known to have been killed in 20 years. Accounts of such killing unreliable"—Larrabee.

48. *Scalops aquaticus* (L.). Carolinian Mole.

Judging by the scarcity of signs, I should think the common mole less common, even in the lowlands of central Pennsylvania, than in the Delaware valley drainage.

⁹ Mr. Nelson has since written that no panthers have been taken since the "Long boys killed one about 4 years ago on the big run of Beech Creek." [Centre Co. ?].

49. *Parascalops breweri* (Bachm.). Brewer's Mole.

A specimen of the hairy-tailed mole is recorded from Hollidaysburg, Blair County, by Mr. F. W. True, in his "Revision of the American Moles." It is in the Museum of Comparative Zoology, Cambridge, Mass.

I have never seen a Pennsylvania specimen, nor know of other records from the State.

50. *Condylura cristata* (L.). Star-nose Mole.

Though no specimens of this mole have been noted by me in central Pennsylvania there is little doubt of its comparative abundance over the entire area. Prof. Baird records a specimen from Carlisle.

51. *Blarina brevicauda* (Say). Northern Mole Shrew.

In the Allegheny Mountains this species is quite typical of the northern form. It is everywhere very abundant.

52. *Blarina cinerea* Say. Least Mole Shrew.

I include this species here on the authority of Prof. Baird, who records one from Carlisle. The only Pennsylvania specimen known to me is in my private collection. It was taken by my friend, Witmer Stone, near Thorndale, Chester County. This southern species is not likely to occur north of the foothills of the Blue Ridge.

53. *Sorex personatus* Is. Geoff. St. Hil. Masked Shrew.

This tiny mammal is sometimes taken by the professional mouser in both the deeper forests and the open grounds near woodland. It appears more numerous in the northern and mountain districts than in the southern lowlands. In the former places it associates with the next species, but is there the rarer of the two.

54. *Sorex fumeus* Miller. Smoky Shrew.

This larger of the long-tailed shrews is abundant in the mountain forests, to which it seems closely confined. It is characteristic of the Alleghenian as contrasted with the Carolinian fauna, whereas the masked shrew inhabits both.

I have specimens from Sullivan, Clinton, Cambria and Somerset Counties.

The rare Marsh Shrew, *Sorex albibarbis*, of which I took a specimen in Monroe County in 1894, will undoubtedly be found to be a denizen of the hemlock swamps of the central Alleghenies. So far, however, it has escaped notice in these localities.

55. *Adelonycteris fusca* (Pal. de Beauv.). Large Brown Bat.

Everywhere abundant, except on the heavier wooded mountain summits.

56. *Vesperugo carolinensis* (Is. Geoff. St. Hil.). Carolina Bat.

Rare in central Pennsylvania. Probably confined to the regions southeast of the Blue Ridge. Prof. Baird secured a specimen, now in the Smithsonian Institution, from Carlisle.

57. *Lasionycteris noctivagans* (LeC.). Silvery Bat.

Numerously distributed over the entire region.

58. *Nycticejus humeralis* O. Thos. Twilight Bat.

The only record of this southern species known to me is a specimen taken at Carlisle by Prof. Baird.

59. *Atalapha borealis* (Müll.). Red Bat.

An abundant species.

60. *Atalapha cinerea* (Pal. de Beauv.). Hoary Bat.

This large bat is little known to the mountaineers, so far as my inquiries have gone. I have never seen a specimen in life. One taken near Renovo, Clinton County, is in the collection of A. K. Pierce, of that borough. From its known range in the United States and Canada it is more likely to be found in middle than in eastern Pennsylvania, from which latter region I have seen and heard of several examples.

61. *Homo sapiens americanus*. Aboriginal American Indian.

Central Pennsylvania at the time of Penn's coming (1682) was inhabited by tribes of Iroquoian linguistic stock, as distinguished from the Algonquin Lenape of east Pennsylvania. The Susquehannocks (Minquas, Conestogas or Andastes) holding originally the main Susquehanna River valley, conquered by the Senecas about 1670, and finally reduced to a remnant, were exterminated near Lancaster by the "Paxton boys," December 27, 1763. Subsequently the Six Nation Onondagas, Cayugas, Oneidas, Senecas, Mohawks and Tuscaroras roamed over the former possession of the Susquehannocks, and sold it to the whites, thus relinquishing Adams, Franklin, Cumberland and York Counties in 1763, Perry, Juniata, Snyder, Huntingdon, Blair, Bedford and Fulton in 1758, Northumberland, Union, Montour, Lycoming, Clinton, Centre, Clearfield, Cambria and Somerset in 1768, and Bradford, Tioga, Potter, McKean and Elk in 1784.

Of Algonquin stock there were wandering Shawnee invasions of the mountain regions west of the Susquehanna in Pre-Columbian times. The Assiwikales of the sea-board in 1731 settled along the Susquehanna and in the watershed of the Monongahela. The Algonkian Nantichokes of Maryland also migrated up the Susquehanna during the middle of the 18th century, settling with the Iroquois at Juniata and Shamokin, and they probably built the mounds covering heaps of human bones near Sunbury, identified by Mr. H. C. Mercer. By the year 1800 they had left Pennsylvania and dwindled to five families living among the Iroquois of western New York.

Of the existing Indians which represent the ancient occupants or claimants of central Pennsylvania there were 98 Senecas and Onondagas living in 1890 on the Cornplanter Reservation in Warren County. There were also 255 Senecas in Indian Territory, 5,133 Iroquois in the seven reservations (Onondaga, Tonawanda, Cattaraugus, Allegheny, Oil Springs, Tuscarora and St. Regis) in New York, in 1890. Beside these may be mentioned 1,200 Shawnees living in (?) 1867, and about 2,500 Cherokees in 1890, all living in Indian Territory.

A few of the more noted Indian villages noted by scouts, missionaries and settlers in central Pennsylvania include the following:—

<i>Indian name.</i>	<i>Modern name.</i>
Chinklaca-moose	Clearfield, Clearfield Co.
Kishaca-quillas	Mifflin Co.
Chillis-quaque (Shawnee)	Northumberland Co.
Shamokin	Shamokin, Northumberland Co.
Conosoragy (Shawnee, 1755)	Near Muncy Creek, Lycoming Co.
Otston-nakin	Montoursville, Lycoming Co.
Quenis-chas-chackki	Linden, Lycoming Co.
Wyoming	Wyoming, Luzerne Co.
Wyalusing	Wyalusing, Bradford Co.
Sesquehanock (Carantonans)	Spanish Hill, Bradford Co.
Oscolni	On Sugar Creek, Bradford Co.
Gohontoto	On Wyalusing Creek, Bradford Co.
Chingilo-molonk	Lock Haven, Clinton Co.

In an exploration of the Susquehanna Valley from Pittston to Harrisburg in 1892 Mr. Mercer writes me he "found ample evidence of former Indian villages along the main river at the mouths of all important streams, and similar proofs establish villages at the

mouth of Canadaguinnet Creek, Yellow Breeches Creek, on the Susquehanna, both left and right banks, near Bainbridge, Lancaster Co., at Caldwells Island, Great Island, and North Branch above Shamokin, along Conewago and Tuscarora Creeks, near Academia, on the Juniata and at the mouth of the Tuscarora. Probably the Shamokin site was the most important on the river in prehistoric times, the sites at Montoursville and mouth of Juniata ranking next."